

COLORADO RIVER RECOVERY PROGRAM
FY-2001 PROPOSED SCOPE-OF-WORK

CAP-7
Propagation Facilities

Lead Agency: U.S. Fish and Wildlife Service

Category (check one)

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☒ Ongoing project
☐ Ongoing-Revised
☐ Requested new start
☐ Unsolicited Project

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I. Title of Proposal: Umbrella Scope-of-Work: Construction of Propagation Facilities for Endangered Colorado River Fishes

II. Relationship to Recovery Program/Ranking Factors:

The Recovery Action Plan (RIPRAP) identifies the following actions (U.S. Fish and Wildlife Service 1998):

- IV.A.4. Secure and manage the following presumptive genetic stocks in refugia
- IV.A.4.a. Razorback Sucker
- IV.A.4.a.(1) Middle Green River
- IV.A.4.a.(2) Upper Colorado River
- IV.A.4.b. Bonytail
- IV.A.4.c. Humpback Chub
- IV.A.4.c.(1) Black Rocks Canyon
- IV.A.4.c.(2) Westwater Canyon
- IV.A.4.d. Colorado Squawfish
- IV.A.4.d.(1) Upper Colorado River
- IV.B. Conduct annual fish propagation activities.
- IV.B.1. Identify feed needs for genetic stock refugia, research, augmentation, and information and education.
- IV.B.2. Produce an Annual Propagation Operation Plan.
- IV.B.3. Conduct NEPA compliance and develop biological opinion on disposal of excess captive-reared endangered fish.
- IV.C. Operate and maintain facilities.
- IV.C.1. Ouray
- IV.C.2. Horsethief (Grand Valley Endangered Fish Facility)
- IV.C.4. Wahweap
- IV.E. Plan, design, and construct needed facilities.
- IV.E.2.a. Ouray expansion
- IV.E.2.b. Wahweap

III. Background/Rationale and Hypotheses

An Element of the Recovery Program

Four large river fishes have been designated as "endangered" under the Endangered Species Act: razorback sucker (*Xyrauchen texanus*); bonytail (*Gila elegans*); humpback chub (*Gila cypha*); and Colorado squawfish (*Ptychocheilus lucius*). A "Recovery Program for Endangered Fish Species in the Upper Colorado River Basin" (Recovery Program) was developed in 1987 (U.S. Fish and Wildlife Service 1987) and implemented in 1988 (U.S. Fish and Wildlife Service 1988).

One of five elements in the Recovery Program for Endangered Fishes in the Upper Colorado River Basin is "native fish stocking" (U.S. Fish and Wildlife Service 1987). The goal of this element is to produce sufficient captive-reared endangered fishes for conducting laboratory and field research and to develop broodstocks with genetic diversity similar to the wild stock used as founders (Williamson and Wydoski 1994).

Captive propagation is an important part of recovery efforts for endangered fish and wildlife because it provides animals for maintaining gene pools in refuges, research and development, information and education, and stocking. The Biology Committee recognizes that stocking is an important fishery management tool that has a definite and useful function. However, this tool is not a substitute for removing or significantly reducing factors that are limiting natural recruitment of the endangered fishes.

The roots of modern fishery management began with fish culture and became considered to be a universal panacea (Radonski and Martin 1986). This belief changed to one in which rational application of stocking protocol can be useful and practical in the recovery of endangered fishes

with proper planning and implementation. Noble (1986) clearly articulated that the goals, objectives, and criteria must be thoroughly considered in development of stocking plans. These plans will be developed by thoroughly considering questions such as: Why stock? What presumptive stock should be used? What are the genetic risks in stocking? What number? What size? What quality? Where and When? and For how long? (Heidinger 1993).

Stocking of endangered fishes in both the upper and lower basins has had limited success because of poor survival of small fish after release. Therefore, the approach to be used by the Recovery Program will be the adaptive management approach where field experiments will be evaluated and adjustments or refinements made as needed to achieve the objectives of the experimental stocking (Boyce 1993; Ludwig et al. 1993; Walters and Hillborn 1978).

Recovery Program Philosophy and Goals Regarding Genetics Management

The Recovery Program's philosophy is to maintain the genetic integrity of wild and captive-reared endangered fishes in the Upper Colorado River Basin to prevent irreversible losses of genetic diversity that may result from management interventions or lack of action.

The Recovery Program's genetics management objectives are:

1. To prevent immediate extinction of any endangered Colorado River fish stocks.
2. To conserve genetic diversity of wild endangered fish stocks through recovery efforts that will protect or restore viable wild stocks by removing or significantly reducing limiting factors that caused population declines.
3. To maintain genetic diversity in captive-reared endangered fish broodstocks that is similar to the wild stock used as founders.

IV. Goals, Objectives, End Product:

Goal: To construct propagation facilities to serve as primary and backup refuges and as growout facilities for priority endangered fishes for the Recovery Program in the Upper Colorado River Basin.

Objectives:

1. To select suitable sites as propagation facilities for genetic refuges, broodstock development, and production for research and development as well as experimental, augmentation and restoration stocking in the Upper Colorado River Basin.
2. To plan, design, and construct propagation facilities for captive-rearing of endangered fishes for the Upper Colorado River Basin.
3. To conduct experimental stocking of razorback sucker in the Upper Colorado River Basin to determine (1) the dispersal of stocked fish, (2) survival by size of fish at release, (3) habitat use of juvenile and subadult fish, (4) best sampling gear to sample juvenile and subadult fish for future monitoring, (5) time of year to release fish, (6) location of release, (7) need for physical conditioning prior to release into a riverine environment, (8) need to alter behavior so that fish can adapt to foods in rivers, (9) interaction with nonnative fish species, and (10) the role of imprinting to fidelity in spawning sites.

4. To conduct experiment reintroduction and augmentation stocking of razorback sucker and bonytail to determine the relation of survival to size at stocking and the importance of physical conditioning (i.e., flow training) to survival.

End Products:

Propagation Facilities: Primary refuges, backup refuges, grow-out ponds, and production facilities.

Captive-Reared Endangered Fish: Broodstock development, refuge to prevent catastrophic loss (i.e., extinction of specific stocks), and fish for augmentation.

V. Description of past performance on this or similar projects:

Propagation of the endangered Colorado River fishes began in 1987 with the construction of some small ponds on the Ouray National Wildlife Refuge to produce fish for experimental stocking. This site was selected because it was along the Green River inhabited by the last concentration of razorback suckers. In 1992, the U.S. Fish and Wildlife Service (Service) initiated a thrust to develop a facility to serve as a refuge, technology development, and propagation for the endangered Colorado River fishes. An arrangement was made with the Service's refuge manager to develop an area on the Ouray National Wildlife Refuge that was an abandoned ranch. An Environmental Assessment was completed in August, 1992 that resulted in a Finding of No Significant Impact (Toney 1992).

In 1993, the Recovery Program developed "Genetics Management Guidelines" (Williamson and Wydoski 1994) to ensure that genetic diversity of various stocks would be maintained in the wild and during captive propagation. The Recovery Program also developed a "Coordinated Hatchery Facility Plan: Need for Captive-Reared Endangered Fish and Propagation Facilities" (Wydoski 1994) to characterize stocks in the upper basin, determine status and trends, establish priorities for propagation, and determine immediate and short-term needs for endangered fish and propagation facilities. Finally, the Recovery Program developed a draft "Genetics Management Plan" (Wydoski 1995) to guide decision-making on natural and captive propagation activities.

Since 1987, Service staff at the Ouray Endangered Fish Facility have gained valuable knowledge, skills, and abilities in culture of the endangered Colorado River fishes in the Upper Basin. In addition, other Recovery Program participants have been involved in the culture of these fishes. A close relationship with the Dexter National Fish Hatchery and Fish Technology Center, that specializes in endangered fish culture and technology, provides ready consultation on a variety of issues regarding endangered fish propagation.

VI. Study area:

The Upper Colorado River Basin in the States of Colorado, Utah, and Wyoming, excluding the San Juan River drainage. Sites that are selected for construction of propagation facilities.

VII. Methods/Approach:

Overview

Currently, three permanent propagation facilities are available to the RIP: Ouray National Fish Hatchery UT (10.8 acres), Grand Valley Endangered Fish Facility CO (8.5 acres), and 8.8 acres of ponds (22 ponds) at the Wahweap State Fish Hatchery UT.

Propagation Facilities Required for the Recovery Program

Immediate and short-term needs for endangered fish for captive propagation are identified by the Biology Committee, including (1) maintaining stocks with a potential for catastrophe in refuges, (2) development of broodstocks for experimental, augmentation, and restoration stocking, and (3) captive-reared fish for priority research. The Genetics Panel recommended that 25 paired matings of the endangered fish be made to maintain genetic diversity that is similar to the wild stock that serve as founders for the broodstock (Williamson and Wydoski 1994). Fishery geneticists agree that even rare alleles can be retained if 50 adult wild fish are used in developing the broodstock. The Biology Committee has concurred with the recommendation of the Genetics Panel. Long-term needs for endangered fish are still evolving and are currently being estimated.

The immediate and short-term needs for captive propagation facilities for endangered fish include two primary refuges, one backup refuge, and growout or production ponds. Although the Recovery Program bottleneck is the lack of recruitment due to high mortality in the early life stages of the endangered fishes, stocking is the fishery management tool to build up the number of adult endangered fish so that natural spawning will be able to sustain the populations when other Recovery Program elements are implemented.

Primary Refuges. Two primary refuges are needed for broodstock development: one for the Green River and one for the Upper Colorado River. The Ouray National Fish Hatchery will be fully operational in FY98 to meet immediate and short-term captive-reared endangered fish as a primary refuge and is considered the primary refuge for the Green River. Ouray National Fish Hatchery being constructed will consist of a hatchery building, ozone water treatment building, 36 ponds with 10.8 acres of surface area and a conditioning pond. The Grand Valley Endangered Fish Facility has been designated as the primary refuge for endangered fish stocks from the Upper Colorado River. This facility is composed of a hatchery building with a reuse water supply, 3.5 acres of ponds at the Horsethief State Wildlife Area, and a 5.0 acre growout pond near the confluence of the Gunnison River with the Colorado River (Clymer's Pond). Surplus funds in FY98 were designated to begin the design, acquisition and construction of facilities to meet the intensive culture needs of Colorado squawfish in the upper Colorado River.

Primary refuges are intended for developing and maintaining broodstocks and for production of fish for priority research experiments. These refuges should have the capability to maintain wild adult endangered fish and spawn these fish using breeding strategies identified in the Genetics Management Guidelines to produce pedigreed family lots. Pedigreed family lots from paired matings requires the construction of small ponds (0.2-acre) to rear the fish until they are large enough for PIT-tagging when family lots can be combined. Small ponds (0.2-acre) are considered optimal for rearing endangered fishes in pedigreed family lots to maintain genetic diversity. Growth rates of razorback suckers, bonytail, and Colorado squawfish have about twice the growth rate of fish cultured in raceways. However, raceways or other propagation facilities may be needed to physically condition captive-reared endangered fishes so that they are able to

cope with the riverine environment and to escape predators. A primary refuge would also be used to rear larvae until the paired fins have developed for stocking into growout ponds since this strategy increases the survival of fish.

Backup Refuges. The main purpose of backup refuges is to maintain priority endangered fishes to prevent catastrophic loss of an Upper Basin stock or to maintain broodstocks or fish for long-term research experiments such as the chemoreception study to determine if Upper Basin stocks imprint. Endangered fish that are maintained in backup refuges would not be handled very often.

Although there is consensus that priority captive-reared fish should be maintained in backup refuges as a safety precaution against catastrophic loss, a backup refuge could be simply a pond with a reliable water supply in a secure area. Modification of existing ponds for ease of collecting endangered fishes can be accomplished inexpensively by sloping the pond bottom and installing a fish trap.

Therefore, various sites could serve as backup refuges. The ponds should be located above the 50-year floodplain to prevent the uncontrolled loss of fish from overbank flooding. Small ponds are not necessary as backup refuges because all of the fish will be PIT-tagged for future recognition. Ponds that are 0.5-acre to multiple-acres in size with sloped bottoms that empty into a kettle or fish trap would be ideal for backup refuges. The pond bottom does not have to be lined in backup refuges.

The backup refuge for Green River stocks and upper Colorado River stocks will be Wahweap State Fish Hatchery UT. The Wahweap SFH currently has 22 ponds (8.8 acres) available for the backup and grow out of razorback sucker and bonytail.

Growout or Production Ponds. The Recovery Program participants have established a high priority for stabilizing the razorback sucker stock in the Middle Green River and for reintroduction of the razorback sucker in the Upper Colorado River. The excellent growth exhibited by this species in predatory-free off-channel impoundments along Lake Mohave (T. Burke and G. Mueller, 1995, Personal Communication), Wahweap State Fish Hatchery (L. Lentsch, 1995, Personal Communication), and gravel-pit ponds along the Colorado River in the Grand Valley (Osmundson and Kaeding 1989) demonstrates that elaborate propagation facilities are not required to produce fish for reintroduction stocking in the Upper Colorado River Basin.

The potential sites for growout production ponds on the Green River are being explored. Potential sites for growout or production for the Upper Colorado River include the ponds on the Horsethief State Wildlife Area, and gravel-pit ponds along the Colorado and Green. Larger ponds (e.g. 1.0 to 3.0 acres) can be used for growout production facilities and it is not necessary for the ponds to be lined. However, it may be desirable for these ponds to have a sloped bottom and a fish trap at the outlet to collect the fish for stocking. Razorback suckers can be captured with trapnets and this method of harvest from ponds with irregular bottoms that cannot be effectively drained has been successful.

To produce adequate numbers of fish for augmentation stocking, the present Recovery Program emphasis should be for acquisition/leasing of riverside growout ponds to meet the necessary production requirements in accepted stocking plans. Experience in both the upper and lower basins has demonstrated that the endangered fish (razorback suckers, bonytail, and Colorado squawfish) can be reared successfully in off-channel ponds or impoundments if these waters do not contain nonnative fish predators. In the Grand Valley, the only major problem encountered

was harvesting the fish because ponds from gravel mining operations could not be drained and the fish could not be readily captured. The solution to this problem is to slope the bottom of the ponds and install a fish trap for collecting fish when the ponds are drained. Also, trapnets have been successful as a tool for collecting fish from ponds with irregular bottoms.

**Defined Mission of Propagation Facilities
in the
Upper Colorado River Basin**

Permanent Facilities and Sites in the Upper Colorado River Basin

1. Grand Valley Endangered Fish Facility CO. The Grand Valley Endangered Fish Facility is composed of ponds at the Horsethief State Wildlife Area, a hatchery building in Grand Junction, and a growout pond at the confluence of the Gunnison and Colorado rivers. The Horsethief State Wildlife Area CO contains 6 ponds that total 3.5 surface acres. The mission of the Grand Valley Endangered Fish Facility is a primary refuge for priority endangered fish stocks from the Upper Colorado River. The broodstocks for Upper Colorado River razorback suckers and Upper Colorado River Colorado squawfish are currently being maintained at the Horsethief ponds.
2. Ouray National Fish Hatchery UT. The mission of the Ouray National Fish Hatchery is a primary refuge for priority endangered fishes from Green River stocks. The main purposes for this refuge are (1) to develop broodstocks through pedigree matings of wild stocks used as founders, (2) to produce fish for crucial field experiments, and (3) to maintain other priority endangered fish for the RIP.

An environmental assessment and Finding of No Significant Impact have been prepared and approved for construction of a water conditioning reservoir, hatchery building, water supply and drain system, effluent pond, and 36 ponds. A Section 7 consultation has been completed with a "no jeopardy" opinion. The Management Committee has approved Ouray as a RIP propagation facility for endangered fishes.

3. Wahweap State Fish Hatchery UT. The mission of the Wahweap State Fish Hatchery is a backup refuge to the Grand Valley Endangered Fish Facility and as a production site to rear endangered fish to a desired size before their release into upper basin rivers. A residence to supply full-time security for buildings, grounds and ponds. A full time presence needs to be established to prevent damage to the facility and endangered fish. Currently, many juveniles residing in the area use the ponds for recreation while it is unmanned. The residence would be cost shared between the State of Utah and the Program (50:50).

VIII. Task Description and Schedule:

Fiscal Year 2001

Task 1 - Grand Valley Endangered Fish Facility CO

An estimated 600 acres of grow out space is required to meet the stocking needs of Colorado State Stocking Plan for razorback sucker alone. Construct at least 10 ponds that collectively total 15 surface acres on BR property near DeBeque, CO. A portion of the construction costs may be cost shared through CDOW with GOCO funds. Lease/acquire additional ponds as they become available.

Target Date: September 30, 2001

Task 2 - Ouray Endangered Fish Facility UT

An estimated 22 acres of grow out space is required to meet the stocking needs of Utah State Stocking Plan for razorback sucker. Secure grow out pond space to meet the Utah State stocking plan. One option might be the construction of 10-15 acres of grow out ponds at Dinosaur National Monument. Lease/acquire additional ponds as they become available.

Target Date: September 30, 2001

Task 3 - Rent coded wire tagging equipment, purchase CWTs and PIT tag readers and tags for tagging fish and identifying fish caught in the field.

Due to the increase of numbers of fished to be stocked over the next several years, based on accepted stocking plans, the Program has initiated the use of coded wire tags as opposed to PIT tags to reduce costs. However, there is the initial costs of getting into such a tagging system. Although the tagging equipment itself can be leased field equipment to identify tagged fish needs to be purchased along with the tags themselves.

Target Date: September 30, 2001

Task 4 - Wahweap State Fish Hatchery

Repair storm damaged areas around ponds and drainage with Armorflex to be cost shared with UDWR (50%).

Target Date: September 30, 2001

IX. FY 2001 Work (cost in \$ 000's)

Task 1 - <u>Grand Valley Endangered Fish Facility CO</u>	\$ 850.0
Complete construction of 15 acres of ponds at DeBeque, CO. (portion may be cost shared with GOCO funds)	
	\$ 550.0
Acquire/lease grow out pond space and configure ponds for retrieving fish	\$ 300.0
Task 2 - <u>Ouray National Fish Hatchery UT</u>	\$ 330.8
Ouray water treatment and well field completion	\$ 250.0
Acquire/lease grow out pond space and configure ponds for retrieving fish	\$ 72.0
Pond modifications for grow out use (8.0 to USFWS and 0.8 overhead)	\$ 8.8
Task 3 - <u>Purchase PIT tags and readers</u>	\$ 118.0
Rental of Coded Wire Tagging Equipment (\$2,500 x 3 facilities x 2 months)	\$ 15.0
Coded Wire Tags (500,000 tags @ \$58/1,000 @ 90-day delivery)	\$ 29.0
Coded Wire Tag Readers	

(Portable Sampling Detector 3@ 5,500)	\$ 16.5
PIT tag Readers	\$ 4.5
PIT tags	\$ 53.0
(No overhead applied because BR makes the purchase directly)	

Task 4 - <u>Wahweap State Hatchery UT</u>	\$ 37.0
Make repairs from storm damage.	\$ 37.0

Grand Total for FY 2001	\$1,335.8
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IX. Budget Summary (in \$ 000's):

FY-2001	\$ 1,335.8
FY-2002	\$ 500.0

X. References

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